



**ITEM SHARED WITH ERA**  
**by NB-RAIL RST SG**

**NB-RAIL REFERENCE:**

**LB-RST-150**

Date: 06.12.2017  
Page 1 of 4

**TITLE / QUESTION**

EQUIVALENT CONICITY CALCULATION

**ORIGINATOR**

**SUBJECT**

RST SG

- TSI LOC & PAS (1302/2014)
- EN14363:2005
- ERA/TD/2012-17/INT v3.0, 17/12/2014
- ERA-REC-120-2015 Annex I
- EN14363:2016
- FprCEN/TR 17039

**DESCRIPTION**

**Issue 1: minimum gauge clearance TG-SR is allowed during the stability tests**

**Background:**

As an alternative to performing on-track tests on two different rail inclinations, §4.3.6.1 **Requirements for tangent track** of **ERA/TD/2012-17/INT v3.0** (which complements EN14363:2005 ) allows to perform tests on only one rail inclination if the reference conditions, which are related to a minimum gauge clearance (TG-SR) of 10 mm, are met.

**Annex I of ERA-REC-120-2015** recommends to consider EN14363:2016 for testing stability, instead of the EN14363:2005, complemented by ERA/TD/2012-17/INT v3.0. **EN 14363:2016** does not provide the requirement  $TG-SR \geq 10$  mm and there is no explanation in §13.1 and 13.2 of the **FprCEN/TR 17039** (which documents the 2016 revision of the requirements provided by the previous standard, i.e. EN14363:2015) about the revision of this requirement.

**Description of the situation:**

If the gauge clearance TG-SR is too small, the assessment by the adopted testing criteria may be less significant: e.g. the oscillation of the wheelset is limited in the amplitude of the lateral displacement  $y$ , the lateral velocity cannot increase and the acceleration cannot increase up to the limit values provided by the EN standard and the TSI.

.....

**Issue 2: parameter to associate to EC values in EC certificates and/or technical files**

**Background:**

**Clause 4.2.3.4.3.2 In-service values of wheelset equivalent conicity of the TSI LOC & PAS** specifies that: *The combined equivalent conicities the vehicle is designed for, as verified by the demonstration of conformity of the running dynamic behaviour specified in clause 6.2.3.4, shall be specified for in-service conditions in the maintenance documentation as set out in point 4.2.12.3.2, taking into account the contributions of wheel and rail profiles.*



**ITEM SHARED WITH ERA**  
**by NB-RAIL RST SG**

**NB-RAIL REFERENCE:**

**LB-RST-150**

Date: 06.12.2017  
Page 2 of 4

**Clause 6.2.3.4 of the TSI LOC & PAS** refers to the EN14363:2005 and ERA/TD/2012-17/INT ver. 3.0 for the assessment criteria of the maximum EC the vehicle was designed and tested for.

**Chapter 13.1 of FprCEN/TR 17039**, related to the equivalent conicity (EC) assessment, highlights that: *“If the target test conditions given in Table 2 of EN 14363:2016 are met additional tests on different rail inclinations and a study about the evolution of wear of the wheel profile are no longer necessary.”*

EN 14363:2016 provides no requirements if these target test conditions are NOT met. TSI LOC&PAS provides no requirements about which parameter shall be declared together with the EC values.

Description of the situation:

A combination of track sections and wheels profiles with high EC, that are able to respect the target test conditions in table 2 of EN 14363:2016, are difficult to be found in some countries in Europe, due to nominal rail inclination of 1:20, rail profile 60E1 and usual wheel profile S1002 or 1/40<sup>th</sup>; e.g. lower values of EC are available in Italy, as mentioned in §13.2 of the FprCEN/TR 17039. Therefore additional tests on different rail inclinations and/or a study about the evolution of wear of the wheel profile could still be necessary.

As the calculation of the EC value depends on the TG-SR parameter, the EC value to be compared with the *“in-service values of wheelset equivalent conicities”* reported in the certificates and/or in the technical file (according to clause 4.2.3.4.3.2. of the TSI LOC&PAS) should be calculated considering the same TG-SR values for which the *in-service values of wheelset equivalent conicities* were calculated.

Otherwise it could happen a dangerous misunderstanding of the EC values by different stakeholders. Example:

- The first NoBo assess the tests performed with a TG-SR = 8 mm (TG=1433 mm, SR= 1425 mm) in order to reach the higher values of EC=0,20 (for a nominal S1002 wheel profile) and only the value of EC=0,2 is reported in the certificate and/or the technical file.
- The succeeding stakeholder (Applicant, RU, NoBo, DeBo, IM), will usually consider a TG-SR = 10 mm coming from the TG nominal value of 1435 mm (corresponding to design value required by clause 5.4.3.3 of the EN14363:2005 for the calculation of the EC with measured *“wheel profile and design rail profile according to EN13674-1 at design inclination and design gauge”*) and the SR nominal value of 1425 mm; the calculated value is then EC=0,17.

Even considering the same wheel profile, the above EC values are different and not comparable. If, in the same wheel profiles condition, the calculated EC is lower than the limit value of 0,2, the 2<sup>nd</sup> stakeholder could allow to further run a vehicle and increase the EC out of the range for which the vehicle have been designed and tested for.

In any case the 2<sup>nd</sup> stakeholder needs more information about the TG-SR used to calculate the EC, e.g. the test reports. This leads to the need of a further assessment.



**ITEM SHARED WITH ERA**  
**by NB-RAIL RST SG**

**NB-RAIL REFERENCE:**

**LB-RST-150**

Date: 06.12.2017  
Page 3 of 4

In the past, NoBo probably declared all the information used to calculate the EC in their certificates in order to highlight the fulfillment of the EN 14363:2005 requirements.

**QUESTIONS**

Issue 1

Which minimum gauge clearance TG-SR is allowed during the stability tests?  
Clarification is needed to ensure correct testing and assessment of the EC values for which the stability of the vehicle is guaranteed.

Issue 2

Which parameter (TG-SR for e.g....) the NoBo shall associate in its certificates and/or technical file, together with the EC values the vehicle was designed and tested for?  
Clarification is needed for:

1. Railway Undertakings, to assess the route compatibility on the basis of the right information in the certificates and or in the technical files;
2. Railway Undertakings, to understand and monitor in the right way the in service values of wheelset equivalent conicities taking them under the maximum equivalent conicities for which the vehicle was tested for;
3. DeBos, to assess correctly the study provided by applicants about the evolution of wear of the wheel profile needed if the target test conditions for stability testing were not met during the first acceptance;
4. NoBos, to interpret correctly the information in the certificates of the previous NoBo in case the succeeding NoBo is assessing an extension of the acceptance on another rail network with different rail inclination. Additional tests on the different rail inclination may be needed.

**SOLUTIONS**

Solution to issue 1:

Ask to ERA to clarify if the stability tests shall be performed considering only TG-SR  $\geq$  10 mm or can be performed with any TG-SR (Q&C).

Solution to issue 2:

1. Formulate a recommendation for NoBos (RFU) to associate, in their certificates and/or technical files, the TG-SR values (or other parameters) experienced during the tests together with the EC value the vehicle was designed and tested for; or
2. Request to the L&P TSI ERA WP on behalf of the railway stakeholders to review the L&P TSI regarding the need to associate the TG-SR values (or other parameters), experienced during the stability tests, to the required in-service values of wheelset equivalent conicities.

**FURTHER ACTIVITIES**

None for NB-Rail. ERA will bring the LB to WG10 CEN (in charge of drafting EN14363).



**ITEM SHARED WITH ERA**  
**by NB-RAIL RST SG**

**NB-RAIL REFERENCE:**

**LB-RST-150**

Date: 06.12.2017  
Page 4 of 4